Changing Public Attitudes to Science and the Quality of Life: Edited Excerpts from a Seminar

DANIEL YANKELOVICH

The Public Agenda Foundation
New York, NY 10022

Editor's Introduction**—From December 1979 through December 1980, a series of faculty seminars were held in Cambridge, Massachusetts, under the auspices of a National Science Foundation funded project on "Ethical Issues in the Assessment of Science: Development and Testing of Indicators of Quality in Science and Technology."* These seminars, led by Gerald Holton (Harvard University and MIT), explored a number of different perspectives on science indicators, engaging the interest of historians, philosophers, sociologists, and political scientists, as well as research scientists and science policy experts.

On 8 December 1980, Daniel Yankelovich outlined to this group his analysis of the changes that are currently taking place in American values and attitudes, changes that could have profound political implications for science and technology. The research project he describes has been undertaken by the Public Agenda Foundation, a nonprofit nonpartisan organization, under subcontract to NSF Grant SRS-8007378 to Harvard University.—MCL

Daniel Yankelovich: Using ordinary polling methods to gauge the judgments people make about how science and technology affect their lives presupposes a false model of public attitudes and opinions. It presupposes that such judgments are held by individuals in an isolated form and are not part of a group process. And it also presupposes that they are instantly accessible, "top of the mind" responses—the same type of judgments made when people are asked, "What brand of toothpaste do you prefer?" or "If the election were held tomorrow, who would you vote for?" If we wish to seek thoughtful public judgments about priorities, or how to allocate scarce resources among various kinds of technology (e.g., research on solar energy, applications of Recombinant DNA, or nuclear waste disposal) or how to divide the pie between science and technology expenditures, we must apply more subtle and powerful methods. Using conventional opinion poll methods to ask, "Would you prefer A, B, or C" is not a sound or feasible method for eliciting quality indicators that reflect thoughtful public judgment.

The issue of public involvement is usually defined in the form of two questions, each reflecting a different point of view. One is, "Should the public be involved at all in this type of decision?" The second is, "If the public is involved, what form should the involvement take?" One form of involvement that has been recently mandated into law entails public participation in hearings. Another form is the use of public opinion polls to get at people's general views. A third form would be that proposed by Kenneth Prewitt,* that

* This material is based upon work in seminars supported by the National Science Foundation under Grant No. OSS-7918701. Any opinions, findings, and conclusions or recommendations expressed are those of the speakers and do not necessarily reflect the views of the National Science Foundation.

** Participants in the 8 December 1980 seminar included William A. Blanpied, Lawrence Bogorad, Harvey Brooks, Peter Buck, Robert S. Cohen, James A. Davis, John Doble, Loren Graham, Stephen Graubard, Thomas Kuhn, Marcel La Follette, Leo Marx, Bruce Mazlish, Alexander Morin, Kenneth Prewitt, Derek de Solla Price, Walter Rosenblith, Barbara Rosenkrantz, Willis Shapley, Leonard Simon, Eugene Skolnikoff, Raymond Vernon, and Christopher Wright.

* Mr. Yankelovich's remarks at the 8 December 1980 seminar

SCIENCE, TECHNOLOGY, & HUMAN VALUES, VOL. 7, NO. 39, SPRING 1982 0162–2439/82/020023–29 $02.50/0

is, to engage the interest of only the public "attentive" to science.

In discussing the results of a recent NORC (National Opinion Research Center) survey on public attitudes toward science, commissioned by the National Science Foundation,* Prewitt argues that the scientific community should seek the active support of what he calls the "attentive public," a somewhat elite group of citizens who are fairly well-educated, interested and relatively well-informed in science. Furthermore, the scientific community should relate to this group as a constituency. The purpose here is to provide a source of support for science in some of the controversies that will arise in the near future.

Prewitt believes that such controversy is inevitable—with respect to allocation of resources, the predominance of technology over science, the role of the scientist, science and technology policy, and the general rise and intensity of single-issue politics related to technology and science. I completely agree with this assessment. The 1980s are likely to be a period of polarization and intense conflict of a kind we have not seen in the United States for some time. Furthermore, it is likely that science and technology policy will be involved in those controversies. Prewitt's expression of concern with this issue, and with finding a sound way to deal with it, makes sense.

Prewitt goes on to argue, however, that the proponents of points of view destructive to science come largely from the mass public rather than from the attentive public, and that science needs (or will need) the backing and support of a powerful constituency such as the attentive public provides. This is a plausible conclusion, but I suspect it is unsound, both as a political strategy and from the point of view of indicators of the quality of science. I believe the mass public *should* be involved, that it has a stake in these issues, and that in a democracy, you must involve the entire electorate in matters of such vital importance. I would also raise questions about the forms of involvement that Prewitt suggests. Setting forth the two contrasting points of view—Prewitt's and my own—may provide a useful framework within which to discuss a new research project designed to uncover the criteria that average Americans use to assess the impact of science and technology on their lives.

The difference between Prewitt's perspective and my own is not on matters of technical expertise (how best to conduct surveys or what the survey findings were). I totally agree with Prewitt on the substance of his research findings. They correspond closely to results of similar research we have conducted at Yankelovich, Skelly, and White. But I do differ with him on the inferences that can be drawn from these findings.

Prewitt's findings show that the public holds science and scientists in very high regard: by a ratio of 7 to 1 the public feels that the benefits of science and technology outweigh the harms, and contribute to the national prestige (which is even more important in today's political climate than it was when the Prewitt study was conducted). His research also shows great public confidence in science's ability to meet certain practical goals, such as predicting earthquakes or getting cheaper energy. It also shows no widespread desire for "populist control" or "participatory democracy." Prewitt sums up: "there is no serious erosion in the confidence of the American public in science and technology," a conclusion at variance with the conventional wisdom that prevailed at the time the study was done. He also quotes a Yankelovich, Skelly, and White study showing that 80% of the public believe that science and technology bring more benefits than problems—a finding confirmed in subsequent research.

Prewitt's findings also suggest that the extent of attentiveness, concern, and involvement of various sectors of the public varies so considerably that it is possible to distinguish (as he does) between an "attentive" and an "inattentive" public. The "attentive public" is defined by three criteria: (1) high levels of interest in science, (2) high levels of current information about science, and (3) commitment to a certain pattern of information acquisition. The attentive public, as defined by these characteristics, is highly correlated with education, to a lesser extent with gender (more men than women), and hardly at all with age. Also, the attentive public has grown considerably, from 8% in 1957, to 18% at the

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relied upon a transcript of Kenneth Prewitt's earlier seminar for explication of the Prewitt model. See Kenneth Prewitt's essay, "The Public and Science Policy," elsewhere in this issue of *Science, Technology, & Human Values*, for further discussion of these ideas.—Ed.

* See *National Survey of the Attitudes of the U.S. Public Toward Science and Technology*, Volume 1: Final Report (National Science Foundation, May 1980).

time the study was done. It is consistently more favorable in its general attitude toward science, in the sense of having a less restrictive attitude.

Prewitt then states that we must avoid the "crude utilitarianism" inherent in political democracy, that is, the view that the main criterion for judging the quality of science and technology should be quick payoff. He sees this view as inimical to the values and interests of the scientific community. As I understand his argument, it is that political culture in a democracy is necessarily based on the concept of "deliverables," that is, "quick payoffs." A democracy, he argues, develops practical, utilitarian perspectives so that as a scientific culture becomes contaminated with political culture, a "quick-and-dirty payoff" form of utilitarianism is stressed. As science and technology become more intrusive and more dangerous, this attitude is likely to grow . . . .

. . . Now, I'd like to state my own contrasting position. Recent studies of the changing attitudes and values of the public lead me to a somewhat different pattern of inferences. For example, we have now in the U.S. (and have had for some time) a growing pattern of skepticism about our institutions, including skepticism about the "wonders" of science and technology. Let me cite just one or two facts from some data on changing attitudes toward quality-of-life issues as they are related to growth.* On the question of confidence in technology (the idea that technology will find a way to solve the problems of society) a bare majority of the public (52%) has that kind of confidence. The older and less well-educated a person is, the more likely he is to have that confidence; and the younger and better-educated, the *less* likely. The range of differences is quite striking. For example, among people older than fifty, this faith is held by 62%; among those who are now in college, it is held by 29%.

In the last decade or so, various polls have explored aspects of the public's scientific world view. In 1970, 30% of the public believed that "everything has a logical scientific explanation"; another 42% said they used to believe that all the mysteries of life would eventually be explained by science but now believed that some things could only be understood in a non-rational way; 28% said they believed that life as we know it is controlled by "strange and mysterious forces that decide our fate." It is interesting to note the direction of the changes that have occurred in these perspectives within the last decade. There has been a modest reduction in the size of the group believing that everything has a logical scientific explanation (30% to 27%), while the group of people saying they used to believe that the mysteries of life would eventually be explained by science, but no longer do, grew from 42% to 48%. The better-educated people who are immersed in the technological outlook are the ones most likely to move toward embracing non-rational explanations, and to question some aspects of the "scientific" world view. These data show a measurable, significant shift that many other research findings support, a shift in Americans' cosmological outlook, an erosion in the consensus view of unqualified belief in science and technology as an instrument of growth and progress.

The causes relate to a profound shift in the structure of Americans' shared values and social norms. All of us are aware of the enormous shifts that have taken place in the domain of marriage, divorce, and family life. The magnitude of the shifts is simply astonishing. In the late 1950s, for example, the University of Michigan found that 80% of Americans believed that a woman who did not marry must be sick or neurotic, that there must be something wrong with her. That belief is now held by a mere 25% of the public; the other 75% accept not marrying as perfectly normal.

The change in outlook with regard to science, technology, progress, and growth is not as dramatic, but it is nonetheless significant. For example, among college students, the level of belief in the idea that "hard work always pays off" has slipped from 73% in the late 1950s and early 1960s to about 43% in the 1970s, from majority to minority status. Most college students are still confident that, in exchange for hard work, they could gain the conventional payoff (that is, married life, a home, an automobile, and respectability) but they do not value it as much as students had in earlier periods and do not believe that it is worth the effort.

My hypothesis is that in the 1980s we will undergo intense social stress because of cultural changes born in the 1960s and 1970s. These changes have now provoked a fierce reaction in

* For a fuller discussion of this point, see Daniel Yankelovich and Bernard Lefkowitz, "The Public Debate on Growth: Preparing for Resolution," *Technological Forecasting and Social Change* 17 (1980): 95–140.

movements such as the "Moral Majority" and among people who feel that the fundamental premises of their lives, having to do with family and church and religion, have been challenged. It is one thing, however, to have such a battle rage in a politically and economically stable society, and another to have such changes superimposed on a society experiencing economic stress due to inflation, due to decline in the median income, and due to the fact that inflation is redistributing income in forms that make people feel there is no social justice. In the 1980s, this cultural backlash will be superimposed on an exacerbated conflict between the "haves" and the "have-nots" and also superimposed on conflicts between young people who work for a living and the growing number of older people who are living on social security. Such conflicts tear at the fabric of our society.

Because these changes have occurred so rapidly, they have not occurred uniformly. At various levels of American society, one can find traditional values in almost pure form, new radical views on quality of life at the other extreme, and a vast in-between. Some of these new views are expressed with theological intensity because ultimate values are at issue. When the Moral Majority discusses evolution, for example, the issue is not so much a controversy over the factual bases of creation as an emotionally charged symbol for a whole set of moral and religious values.*

Science and technology will not be permitted to stand aloof from this values controversy. On the contrary, they will be plunged into the middle of it. My concern, coming back to Prewitt's conclusion, would be that if the scientific community tried to make common cause only with the so-called attentive public, it would be enlisting on one side of a social-class battle, because the "attentive public" is not so much a scientifically minded cross section of the public as it is an educated elite who share certain outlooks and values with the scientific elite. To make common cause with them readily implies that the mass of the public, the 82%, are presumed to be the enemy. I think this is bad politics, because it politicizes and contaminates science and technology issues with ideological, social-class issues. It would so confuse the situation that science and technology would be put on the defensive, because the majority of the public—a riled-up majority—would then be put in the position of becoming adversaries. It also presupposes that the evaluative criteria of the 18% "attentive public" will be less crassly utilitarian than the criteria of the less knowledgeable 82%, which may be an incorrect assumption.

My quarrel with this approach is that, for narrow scientific issues, the "attentive public" doesn't know enough science to serve as a jury of peers which can make decisions on a sound technical basis. To the extent that these are political values, why exclude the mass of voters? The split, in other words, between the attentive public and the mass public is based on a supposition of shared values—a premise that is not a sound basis for the issues we are looking at. Why not involve the entire public? Why not bring into the picture those people who do not go to science museums and do not read science magazines and do not do some of the things that the attentive public is supposed to do, but whose lives and futures are just as affected by these technological decisions as the people in the so-called attentive public? . . .

Everybody who has studied this issue has found that it is extremely difficult to get the public to distinguish between science and technology. It is almost impossible to do it with a conventional public opinion poll. It may be possible to do it with a technique I am currently testing. We bring people together as a group and give them a chance to gain some background and understanding on matters of policy with respect to technology.

A policy with respect to the uses of technology, for example, often concerns the allocation of resources. Presuming that our society's resources are scarce and that we cannot do all the things we want, to what projects shall we give priority? Matters of choice on issues like health and energy turn out to be value choices; these are issues that relate to the kind of values that people want the society to represent, the kind of society they want to live in. Those values are often hidden or are defined in technological terms when they should be defined in value terms. In the debate over nuclear power, for example, there is a deep interpenetration of technical questions about safety with value questions about what kind of society should exist and how technology should be used to achieve it. Those are fundamentally political issues, which require public participation. Our

* These and other on-going changes in American values are discussed at greater length in Daniel Yankelovich, *New Rules: Searching for Self-Fulfillment in a World Turned Upside Down* (New York: Random House, 1981).—Ed.

project will try to find out what criteria people bring to bear when they make judgments about where to allocate limited resources.

The research method involves two instruments. One is a Personal Priorities Inventory for making judgments about science and technology; this is a quality-of-life scale which asks people to state what is truly important to them personally. There are several subdivisions. One pits the quality-of-life values against utilitarian instrumental values, the "small is beautiful" kind of concern. . . . There is also a set of risk-benefit trade-offs. How much risk and danger will people accept for the sake of economic growth, or national prestige? There is a set of more irrational values, for example, "freedom from Ralph Naderism" (that is, the freedom not to have people tell you what's good for you). There is a very strong strand of anarchic feeling in the society today. Studies show an intense concern over the theme of loss of control. People feel that they're losing control over when or whether they will retire, maintaining a stable income against inflation, over their lives in general. These fears certainly affect their judgments on value choices. Our inventory of questions attempts to get people to position themselves on the values most important to them at that moment.

The second instrument includes six or more specific proposals for research on science or technology. These proposals incorporate different kinds of payoffs—industrial payoffs, consumer payoffs, power for the society, knowledge results, human results, beneficent results for all humankind. They entail different levels of risk and rewards. They make different promises within different time scales. They promise benefits, some of which are murky versus some that are very clear-cut. They deal with the controversial and the non-controversial. These proposals also represent issues that members of the science and technology community feel should be pursued or should get a portion of available resources. The proposals have also been reviewed by specialists and by representatives of the various sides discussed. These two instruments—(a) the values inventory, and (b) the specific research proposals and the arguments for and against them—are written in terms that average people can understand . . . .

In sessions that last for several hours, we review each of the proposals and give each group the chance to argue and discuss as if they had to make the decision themselves. Each group of fifteen acts like a jury, using social interaction to arrive at "public truth." . . .

The important thing is to give people a chance to argue, to interact, to make explicit the basis on which they prefer or reject each proposal. The socialization process is such that, when the pros and cons of each proposal are made explicit, the discussion moves from technical considerations to value considerations. The emphasis is on judgments related to the kind of life we want to live, arguing the pros and cons, making explicit the benefits and the risks in human terms. We are not consulting the public to get a technical judgment, but to get a political judgment.

The goal of the project is to have people "work through," argue, fight about those proposals, and come to some consensus at the end (if possible). We can then measure the changes that have taken place between the initial and later votes, and gain some understanding of what moved people to change their minds. Using that design, a number of interesting results can be obtained. First, we gain a picture of how people respond before they have had a chance to engage the arguments and hear other people's points of view. Then we gain a picture of how much they have been changed by the arguments. It really puts the values to the test and makes them explicit. We get the *considered* judgment of the public rather than a top-of-the-head, top-of-the-mind judgment. . . .

Finally, let me stress the importance I give to finding some way to replicate the social process of decision-making. If the public is going to be involved in policy decisions, people must have a chance to wrestle with the proposals, to have a true dialogue with their peers, rather than simply have their superficial judgments recorded. This process of dialogue and argument will be better for science and technology. The results will be less crassly utilitarian than the approach that attempts to persuade the "thoughtful opinion leader elite" to support particular proposals in political battles. Admittedly, this approach expresses a faith in democracy and a faith in the concept of an informed public. In the context I have described, "informed" does not mean the attentive public, does not mean only the people who are knowledgeable about science and keep up with it. It does mean "informed" in the sense of having the opportunity, within a structured setting, to face alternatives and to make explicit the value premises in terms of what those alternatives should be. From the point of view of

making quality indicators explicit and of giving science a firmer, larger political base on which to base future support, that is certainly better than an approach on a "class warfare" type base . . . .

Editor's Note: In the discussion following Dr. Yankelovich's talk, participants focused on some of the difficulties involved in measuring public attitudes to technical issues that are undergoing rapid change. Some of the dialogue directly pertaining to this topic is included below. Some social scientists are attempting to correlate media coverage of controversial science or technology issues with data gathered in public attitude surveys. One researcher, for example, has shown that when media coverage of a controversy (and, hence, the amount of information available to the public) goes up, then public opposition to a proposal also rises; and when media coverage decreases, so does the recorded public opposition. In the discussion period, I asked Dr. Yankelovich whether or not the fact that people are presented in these groups with more (often new) information on the various research topics could bias the panels toward* opposition *of the research.*

Yankelovich: Certainly when people get more information, and think through issues, opposition can firm up. . . . Discussion can polarize as well as create consensus. One interesting example involves public attitudes on the Panama Canal treaty. When the Carter Administration found that most of the people who were opposed to the Panama treaty were opposed because they lacked certain information, they mobilized an information program on Panama; it had two results. One was what the Administration hoped would happen: as people got more information, the number of people in favor of the treaty increased. But something else also happened—the opposition also solidified. Both things happened at the same time. That is one of the effects of thinking something through. What you get is the distillate, the precipitate of people's thought-through views, and they are different from the views people have before they start the working-through process. This effect could work in both directions.

Alex Morin made a very important point earlier in the discussion regarding people's tremendous need to be consulted. The act of bringing them into the picture and consulting them has an effect by itself. Part of that effect, within a group, is for the group to want to seek accommodation rather than obstruction. Once people are consulted, there is an impetus in the dynamics of the group process to see if some sort of common ground can be found. If there is any bias in the group dynamics, it will be a bias toward consensus—which is why I think it will be interesting to contrast viewpoints before people are given any information (because that approximates the state of the public in general) and their views after participating in that group process, to look at the nature of the change and the dynamics that underlie it. From the research findings you would learn two things: one, the pre-workthrough response, and the other, the post-workthrough response.

Stephen Graubard (Editor of *Daedalus*): In your remarks on democracy, you are entering a field that is mined with elements of controversy. There is a substantial question of not only whether there has ever been successful public pressure of the kind you describe, but also whether democracy at any time has been capable of the kind of responses that you indicate. Are you starting with a notion of ultimately affecting opinion (and even action) in a way that for a hundred years or more theorists preoccupied with democracy have thought to be impossible? . . .

Daniel Yankelovich: That is a difficult question. If my assumption about the 1980s being a troubled period is false, then the results of the exercise may have some theoretical interest but possibly not much practical value. . . . On the other hand, if the 1980s do turn out to be a societal cockfight, with science and technology in the middle, and if the political pressures loom urgently, a whole range of questions will arise about how best to respond, to defend, and about what techniques of involvement to use. Almost inevitably, political pressures through Congress or through an articulate group like the Moral

* See, for example, remarks by Allan Mazur on p. 29 of *Science, Technology, & Human Values*, Summer 1981, No. 36.

Majority or some other self-appointed interest group will tend to dominate . . . .

If there is turmoil, then we may have opened an avenue of insight into the public mind and how it engages these issues which will be of keen interest—and great surprise—to the scientific community. The result may be discouraging in some respects, encouraging in others, but certainly different from the stereotypes and expectations.

There are profound advantages and dangers in democracy, but they all reduce to one rather simple point. In a free society, where citizens have the ultimate power, if you fail to consult or involve them, and if they can vote, then you can provoke all kinds of mischief and trouble. In our kind of democracy there must be some viable method for making people feel like responsible citizens. Should we not have some insight into how the public does think? What would happen if there were this kind of consultative process on issues that involve the public most deeply? . . .

Yankelovich: . . . The research strategy is dictated by data indicating that people do not feel qualified to make judgments, and that they believe certain questions are for the experts to decide. There is a tendency for an individual to divide issues into "those appropriate for the experts because they are technical" and "those appropriate for me because they concern the way I want to live my life and the kind of society we are going to have."

[Responding to a question, Yankelovich continued:] You suggest that if issues occur in the real world with five sides, we should try to see the extent to which people can wrestle with them. That strategy, at least, leads to a useful insight. In ascertaining information and getting the public involved, there is a certain cut-off in terms of level of complexity, but we may wish to see what level of complexity the public can engage rather than assume in advance that the complex cases cannot be gauged.

. . . I think you can force people in these groups to make decisions by saying "We're talking about an issue where the range of controversy in the scientific community is so great that for almost every scientist involved there is a different opinion, and they range from A to Z. Nevertheless, even though the scientists disagree, we want you to come to grips with this issue and make decisions about it, because we want to see the basis on which you make them." Now, if under those conditions, you cannot force people to come to conclusions, that is an interesting finding. If you can, and you see what the basis is, that is also interesting. . . . There is a large group of citizens who say about these matters, "Why are you talking to me? Why are you consulting me, what does it have to do with me?" You cannot get people to engage with a problem until you answer that question.

. . . In the 1960s and the 1970s, the majority of the public felt they could have more of everything and, furthermore, that they were entitled to more of everything. Now people fear they may end up with nothing. These two states of mind co-exist even though they are contradictory. People are increasingly beginning to realize that they cannot have more of everything, *and* that they may not be entitled to more of everything. There is beginning to be suppression, if not repression, of certain desires. In the 1980s we will, I suspect, see the evolution of a new social ethic, one that is neither the old self-denial Protestant Ethic nor the "duty to self" ethic that momentarily replaced it in the 1960s and 1970s.

Any new social ethic, in our present condition, is bound to be unstable. The situation produces a moving target. The project I have described attempts to look at these values as they change in relationship to emerging technical issues, with the understanding that the process is going to be dynamic and modified but that, at any one moment, we can gain a good understanding of where the public stands in relationship to these values, and how it employs them in assessing specific proposals for uses of technology. . . . You can think of it, as I do, as a cultural revolution or as mere drift, but the culture in this society *is* changing. Within that framework of change, the issues of science and technology are central. There is a change going on in Americans' world view, and science and technology are at the center of that change.